IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Marugan et al.	
Application No.: 10/605,671	
Filed: 10/16/2003	Group Art Unit: 1712
Title: Light Colored Polycarbonate Compositions and Methods	Examiner: Marc S. Zimmer
Attorney Docket No.: GEPL.P-077	

REPLY BRIEF FOR APPELLANT

This Reply Brief is filed in support of Applicants' Appeal from the rejection mailed on March 1, 2006, and in response to the Examiner's Answer mailed September 26, 2006. This Reply Brief addresses issues and arguments raised in the Examiner's Answer.

The present invention is premised upon a solution to an unexpected problem. The unexpected problem is that a reduction in flame-performance properties occurs in articles made from three-component compositions comprising (1) polycarbonate-siloxane copolymer, (2) polycarbonate, and (3) titanium dioxide as compared to articles made from compositions having only two of these components. This result is unexpected and is an exception to the general principle upon which the Okumura reference is based, namely that the flame performance properties of articles made from two-component compositions having component (1) (i.e. the polycarbonate-siloxane copolymer) and either of component (2) (i.e. polycarbonate) **OR** component (3) (i.e. titanium dioxide) is enhanced, or at least not hindered, by the combination of the two components.

The Examiner's Answer outlines the unexpected problem of the three-component mixture and further evidences that such a problem or such a three-component mixture is not accounted for or suggested anywhere in Okumura. The Examiner concludes:

> "[I]t is noted that Table 1B and 2B [of Okumura] summarize the results of formulating together a polycarbonate homopolymer and a polycarbonate-siloxane

> copolymer with the result being in all cases that the combination exhibited a V-O rating . . . Tables 1D and 2D summarize the results of numerous experiments wherein polycarbonate-polysiloxane copolymer and pigment, usually titanium dioxide, were combined and these compositions also had a flame resistance rating of V-O. **Because each of the two-component compositions were given a V-O rating, it is absolutely expected that, were all three materials to be combined, the resulting three-component composition would, likewise, provide a V-O rating."** *See* the first paragraph on page 14 of the Examiner's Answer.

Applicants continuously, consistently, and herein again demonstrate this argument is incorrect because the result that the Examiner says is "absolutely expected" is not generally observed to occur.

Applicants direct the Board's attention again to the Examples section of the present specification. It can be seen that in Example 1 and the results contained in Table 3 that compositions 1-11 which contain (1) polycarbonate-polysiloxane copolymer (12%, 2.4% siloxane), (2) polycarbonate, and (3) titanium dioxide have decreased flame performance properties as compared to the 2-component control example which is similar to that of Okumura which contains only (1) polycarbonate-polysiloxane copolymer (12%, 2.4% siloxane) and (2) polycarbonate. Furthermore while the control example had a 91 % chance of achieving a V-O flame rating at a thickness of 1.6 mm on a first test, **each** three-component composition (i.e. compositions 1-11) had over a 40 % decrease in its chance of achieving the same V-O rating under similar conditions.[1] Therefore, where "all three materials" are combined, it is not true that the three-component composition necessarily achieves a V-O rating.

As detailed in Appellants' Appeal Brief and above, Okumura does not disclose the 3-component mixture of the present invention nor does it suggest the unexpected problems encountered when combining the specific three components. Nowhere in Okumura can one find any mention of a **three-component** mixture having a polycarbonate-polysiloxane copolymer, titanium dioxide having an organic coating, and polycarbonate and in the amounts as such is

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[1] The only exception being composition 2 which had a 20% decrease in its chance of achieving the same V-O rating under similar conditions. The % decrease in the chance to achieve the same V-O rating is based on the control example's chance of achieving the V-O rating (i.e. 91%).

claimed in the present application. Only by using the disclosure of the present application can one achieve the solutions (i.e. the claimed compositions, articles, and methods) to the unexpected problems encountered when combining these specific components.

The Examiner's assertion that the "first thickness" of the articles is "arbitrary" is in error. The first thickness of the articles is not arbitrary rather it is important. In assessing flame-retardance of an article it is particularly relevant to consider the point of minimum wall thickness, since this is the region of the article that is most flammable. In the article claims, the minimum wall thickness of the article is referred to as the "first thickness" and the amount of polycarbonate-siloxane copolymer in the composition is selected such that a VO UL fire rating of the composition is achieved at this minimum thickness. As taught and claimed in the present application the selected amount of polycarbonate-siloxane copolymer depends on the minimum thickness of the article, the amount of polycarbonate, the amount of the titanium dioxide, and the type of coating applied to the titanium dioxide. This is not taught nor is it suggested in Okumura.

The Examiner's belated assertion that the Applicants should have claimed p(FTP) properties rather than a V-O rating of the articles of the present invention is irrelevant in view of the present 103 rejections. *See* pages 12 and 13 of the Examiner's Answer. Applicants nonetheless note that the "p(FTP)" property directly relates to the desired V-O rating as it is indicative of the chance that an article of a certain thickness has of achieving the V-O rating.

A V-O rating is itself based on a plurality of tests of specimens made from a certain material at a certain thickness under the UL94 vertical testing standard. Applicants attach to this reply as Exhibit A a printout from http://www.ides.com that describes the UL94 vertical testing standard and the requirements that must be achieved for an article to achieve a V-O rating. As shown on pages 1 and 2, for a material to achieve a V-O rating at a certain thickness each and every one of 10 samples (2 sets of 5) must be, *inter alia*, self extinguishing within 10 seconds of removing the test flame and must not drip flaming particles that ignite a cotton cloth disposed beneath the sample. The vertical UL94 test, however, does not directly indicate a specific rating of the same material at a different thickness in that a material rated V-0 at one thickness indicates nothing with regard to a rating at a smaller thickness. For example a material that barely achieves a V-0 rating a large thickness would not necessarily achieve a V-0 rating at a

smaller thickness while a different material that easily achieves the V-0 rating at the same large thickness may very well likely also achieve a V-O rating at the same smaller thickness.

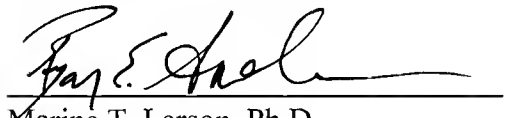
The p(FTP) properties on the other hand do indicate the behavior of materials at different thicknesses. Namely, a material having a p(FTP) of 0.9 at a large thickness would likely have a better chance at achieving a V-0 rating at a smaller thickness as compared to a material having a p(FTP) of less than 0.9 (e.g. 0.8) at the same larger thickness.

Applicants note that the p(FTP) properties as illustrated in the specification are included to teach those skilled in the art (1) how to practice the present invention, (2) how to select the key factors, and (3) how the key factors relate to one another. Namely, the selection of the articles minimum thickness is dependent upon the selection of the composition and visa versa. The Examiner's suggestion that a certain p(FTP) is required (i.e. 0.9 or greater) places undue focus on the nature of this discovered relationship. *See* page 12 of the Examiner's Answer. As a first matter, Applicants note that nowhere in the specification do they state that an article made from the 3-component mixture is required to have a p(FTP) greater than 0.9. Secondly, the Examiner's attempt to discredit Applicants teachings by focusing on entry 18 is misguided. *Id.* Entry 18 illustrates a teaching that an article having that specific composition should also have a larger minimum thickness.

Applicants resubmit all of the arguments and assertions made in their Appeal

Brief and further submit that for all of the foregoing reasons the 103 (a) rejections should be reversed and that all claims (i.e. 72-132) of this application are in form for allowance. Such action is earnestly solicited.

Respectfully submitted,



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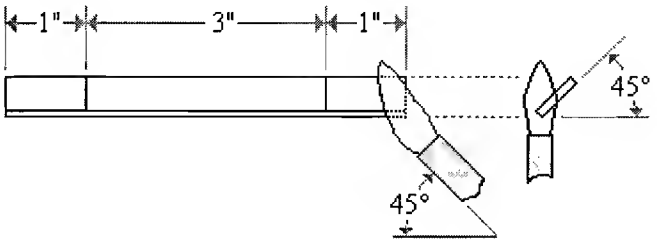
UL94 Explained

UL Flame Rating - UL94

UL flame ratings group materials into categories based on their flammability. UL94 covers two types of testing: vertical burn and horizontal burn.

Horizontal Testing (HB)

Procedure: A specimen is supported in a horizontal position and is tilted at 45°. A flame is applied to the end of the specimen for 30 seconds or until the flame reaches the 1 inch mark. If the specimen continues to burn after the removal of the flame, the time for the specimen to burn between the 1 and 4 inch marks are recorded. If the specimen stops burning before the flame spreads to the 4 inch mark, the time of combustion and damaged length between the two marks is recorded. Three specimens are tested for each thickness.

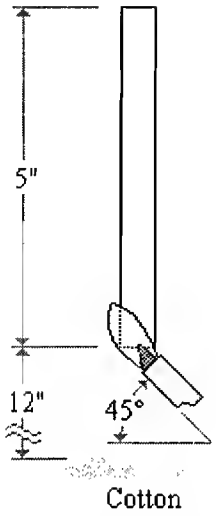


Horizontal Flame Test

Horizontal Rating	Requirements
HB	• Specimens must not have a burning rate greater than 1.5 inches/minute for thicknesses between 0.120 and 0.500 inches and 3 inches/minute for thicknesses less than 0.120 inches. • Specimens must stop burning before the flame reaches the 4 inch mark.

Vertical Testing (V-0, V-1, V-2)

Procedure: A specimen is supported in a vertical position and a flame is applied to the bottom of the specimen. The flame is applied for ten seconds and then removed until flaming stops at which time the flame is reapplied for another ten seconds and then removed. Two sets of five specimens are tested. The two sets are conditioned under different conditions.

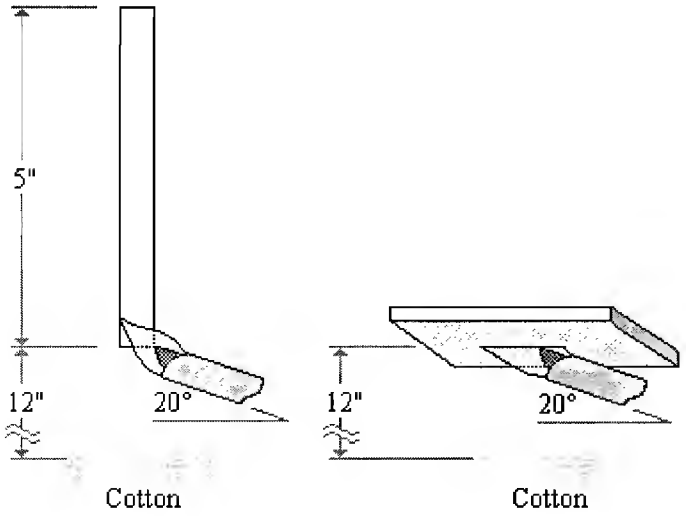


Vertical Flame Test

Vertical Ratings	Requirements
V-0	• Specimens must not burn with flaming combustion for more than 10 seconds after either test flame application. • Total flaming combustion time must not exceed 50 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding clamp. • Specimens must not drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 30 seconds after removal of the test flame.
V-1	• Specimens must not burn with flaming combustion for more than 30 seconds after either test flame application. • Total flaming combustion time must not exceed 250 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding clamp. • Specimens must not drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 60 seconds after removal of the test flame.
V-2	• Specimens must not burn with flaming combustion for more than 30 seconds after either test flame application. • Total flaming combustion time must not exceed 250 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding clamp. • Specimens can drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 60 seconds after removal of the test flame.

Vertical Testing (5V, 5V-A, 5V-B)

Testing is done on both bar and plaque specimens. Procedure for Bars: A bar specimen is supported in a vertical position and a flame is applied to one of the lower corners of the specimen at a 20° angle. The flame is applied for 5 seconds and is removed for 5 seconds. The flame application and removal is repeated five times. Procedure for Plaques: The procedure for plaques is the same as for bars except that the plaque specimen is mounted horizontally and a flame is applied to the center of the lower surface of the plaque.



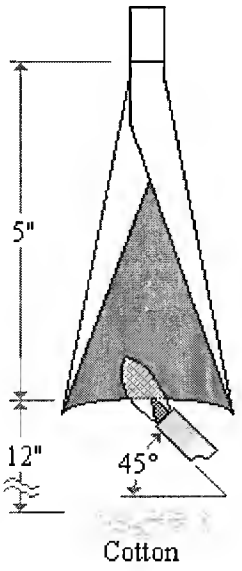
Vertical Flame (5V Type) Test

Vertical Rating	Requirements
5V	• Specimens must hot have any flaming or glowing combustion for more than 60 seconds after the five flame applications. • Specimens must not drip. • Specimens must not be destroyed in the area of the flame.
5V-A	• Specimens must hot have any flaming or glowing combustion for more than 60 seconds after the five flame applications. • Specimens must not drip flaming particles that ignite the cotton. • Plaque specimens must not exhibit burnthrough (a hole).
5V-B	• Specimens must hot have any flaming or glowing combustion for more than 60 seconds after the five flame applications. • Specimens must not drip flaming particles that ignite the cotton. • Plaque specimens may exhibit burnthrough (a hole).

Vertical Testing of Thin Materials (VTM-0, VTM-1, VTM-2)

Ex. A

This test is used for materials that are thin, or are too flexible or may distort, shrink or flex during ordinary vertical testing. Procedure: An 8x2 in specimen is rolled longitudinally around a 1/2 in diameter mandrel and taped on one end. When the mandrel is removed the specimen forms a cone. The cone is supported in a vertical position and a flame is applied to the bottom of the specimen. The flame is applied for three seconds and then removed until flaming stops at which time the flame is reapplied for another three seconds and then removed. Two sets of five specimens are tested. The two sets are conditioned under different conditions.



Vertical Flame Test for Thin Materials

Vertical Rating for Thin Materials	Requirements
VTM-0	• Specimens must not burn with flaming combustion for more than 10 seconds after either test flame application. • Total flaming combustion time must not exceed 50 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding clamp. • Specimens must not drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 30 seconds after removal of the test flame. • No specimen shall have flaming or glowing combustion up to a mark 5 inches from the bottom of the specimen.
	• Specimens must not burn with flaming combustion for more than 30 seconds after either test flame application. • Total flaming combustion time must not exceed 250 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding

VTM-1	clamp. • Specimens must not drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 60 seconds after removal of the test flame. • No specimen shall have flaming or glowing combustion up to a mark 5 inches from the bottom of the specimen.
VTM-2	• Specimens must not burn with flaming combustion for more than 30 seconds after either test flame application. • Total flaming combustion time must not exceed 250 seconds for each set of 5 specimens. • Specimens must not burn with flaming or glowing combustion up to the specimen holding clamp. • Specimens can drip flaming particles that ignite the cotton. • No specimen can have glowing combustion remain for longer than 60 seconds after removal of the test flame. • No specimen shall have flaming or glowing combustion up to a mark 5 inches from the bottom of the specimen.

Similar Standards

- IEC 60695-11-10